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Stem-internal and affixal morphology in Shilluk

Bert Remijsen, Cynthia L. Miller-Naudé, and Leoma G. Gilley

1. Introduction

There are languages that present rich systems of inflection and derivation, whereby stem-internal features – often suprasegmental ones – are heavily involved in morphological exponence. One of these is Shilluk, a Western Nilotic language within the Nilo-Saharan language family. Shilluk marks morphological processes primarily through patterns of tone, vowel length, vowel quality, and consonantal nasalization. The importance of stem-internal exponence is illustrated in (1), where the final syllable of the verb conveys centrifugal deixis and 2nd person singular inflection, in addition to the lexical meaning of the verb. Plural marking on the noun is also stem-internal.

- (1) **jéŋ** **á-ŋǎl**
tree:PL PAST-cut:FUG.2SG
‘You went to cut the trees.’

For Dinka, also a Western Nilotic language, this system has been described in detail by Torben Andersen (e.g. Andersen 1992-1994). For related Western Nilotic languages that are similarly configured – Nuer, Thok Reel and Shilluk – the stem-internal morphology remains understudied. In this context, this paper presents a summary description of the range of morphological exponence in Shilluk. Sound examples are included for the forms in bold.

Morphological processes perform a wide range of functions in Shilluk. In verbs we find marking for tense-aspect and evidentiality (Miller & Gilley 2007); agreement; spatial deixis; information structure; nominalization; and several valency-changing operations. Nouns are marked for number, demonstrative, modification and possession. The set of grammatical functions in which morphological marking is involved is so large that it is not possible to describe these functions adequately in the current paper. Instead, we focus on the patterns of exponence that encode these values. Illustrations will be drawn mostly from transitive verbs and from nouns.

We will first discuss stem-internal exponence (Section 2), and then move on to affixal markers (Section 3). In Section 4 we point out some general characteristics of stem-internal morphology, and we briefly consider Shilluk morphology in its diachronic context.

1.1 Background on Shilluk phonology

With the exception of the stem-initial consonant, all of the phonological properties of the stem can play a role in morphological marking. For this reason, a brief summary of the Shilluk sound system is relevant.

The consonant inventory includes ten plosives and five nasals: /p,b,m; t,d,n; t̪,d̪,n̪; c,ɟ,n̪, k,g,ŋ/. Voicing in plosives is only distinctive in the stem-initial consonant. Stem-final plosives vary allophonically in voicing and also in manner. We represent them with the voiceless plosive character. The remaining consonants are the liquids /l,r/ and the semivowels /w,j/. The vowel inventory includes two sets, which differ in specification for Advanced Tongue Root (ATR). The –ATR vowels are /ɪ,ɛ,a,ɔ,u/; the +ATR vowels are /i,e,ʌ,o,u/. ATR is realized primarily through vowel height, and to a lesser extent through voice quality (Remijsen, Ayoker & Mills 2011).

Stem vowels are short, long, or overlong – transcribed /v,vv,vvv/, respectively.¹ Affix vowels are short or long. Eight distinctive tone patterns (tonemes) are found in transitive verb stems. There are the three level tonemes Low /c̣ṿc/, Mid /c̣ṿc̣/, and High /c̣ṿc̣/; the Rise /c̣ṿc̣/; and four falling contours. Of the latter, the Low Fall /c̣ṿc̣/, the High Fall (to Low) /c̣ṿc̣/, and the High Fall to Mid /c̣ṿc̣/ are all early-aligned. The Late High Fall (to Low) /c̣ṿc̣/ is late-aligned.² Nouns additionally present another late-aligned falling contour, the Late Low Fall (/c̣ṿvṿc̣/). While the other tonemes appear in several morphological forms, this ninth tone pattern is limited in its distribution to some noun demonstratives that have an overlong vowel. In affixes the tonal inventory is limited to the three level tone categories Low, Mid, and High.³

Content-word roots in Shilluk are highly restricted in shape. They consist predominantly of a single closed syllable – e.g. *p̣âac* ‘village:SG’. Consonant clusters are only found in the onset, where a semivowel can follow the root-initial consonant – e.g. *ṭjél* ‘elbow:SG’, *kẉān*

¹ One minimal-set example is *á-ḳol* ‘PAST:offend:FUGAL.2SG’ vs. *áḳol* ‘drumstick:SG’ vs. *áḳool* ‘drumstick:PL’; another is *ḅul* ‘grill:2SG’ (v.) vs. *ḅul* ‘drum:SG’ vs. *ḅuul* ‘drum:SG.DEM’. See also Remijsen, Ayoker & Mills (2011), Jorgensen (2015).

² The sequential representation of late-aligned tone patterns – as in *c̣ṿc̣* and *c̣ṿc̣* – is an ad-hoc device to transcribe distinctive tone categories, in view of the rich inventory of falling tone patterns.

³ The categories Low, Mid, High, Rise, Low Fall, High Fall, and Late High Fall are laid out and illustrated in Remijsen et al. (2011). The High Fall to Mid and the Late Low Fall are argued for in Reid’s (2009) study of Shilluk noun morphology; we have since also found the High Fall to Mid in applicative forms of Fall verbs (cf. Table II).

‘porridge:SG’. Roots yield polysyllabic words by combining with prefixes and suffixes. For example, the verb root |keel|⁴ ‘spear (v.)’ yields forms such as *ú-keel-i* ‘FUT-spear-ITER’ and *á-keel-á* ‘PST-spear-1SG’. As seen from these examples, affixal morphology is typically accompanied by stem-internal marking.

2. Stem-internal exponence

2.1 Vowel length

In this section we will first describe the role of vowel length in transitive verbs, and then consider vowel length in nouns and in adjectives. The lexical roots of transitive verbs have either a short or a long vowel. This lexical level of length can be observed, among others, in the basic past tense. There are numerous forms, however, in which the stem vowel is overlong for the most verbs. Three patterns of alternation need to be distinguished here; they are illustrated in Table I. First, there are verbs that have a short stem vowel in the basic past tense, and whose stem vowel remains short throughout their paradigm. These are the ‘Fixed Short’ verbs. A second group, the ‘Short with Grade’ verbs, also has a short vowel in the basic past tense, but the vowel lengthens to overlong in many morphological operations, including past tense 2nd singular. Finally, there are the ‘Long’ verbs. They have a long vowel in the basic past tense, and lengthen to overlong in several inflections. The past tense 2nd singular form brings out a salient characteristic of morphological lengthening in Shilluk: it is ‘overlengthening’. That is, morphological lengthening results in an overlong vowel, for short and long root vowels alike. Note that this configuration is different from the one in Dinka, where morphological vowel lengthening adds one level of length: /cvc/ > /cvvc/; /cvvc/ > /cvvvc/ (Andersen 1992-1994).

⁴ The |...| notation is used to refer to lexical roots, abstracting away from all morphological specification.

Table I. The three patterns of lexical and morphological length in transitive verbs.

	Fixed Short		Short with Grade		Long		
	ɲɔl	lɛŋ	cam	mɒl	keel	luɔŋ	luɔŋ
	‘cut’	‘drum’	‘eat’	‘roast’	‘spear’	‘pluck’	‘take turns’
PST	á-ɲɔ́l	á-lɛ́ŋ	á-cám	á-mɒ́l	á-kéel	á-lúɔŋ	á-lúɔŋ
PST 2SG	á-ɲòl	á-lêŋ	á-càaam	á-mâɒl	á-kèeel	á-lùuɔŋ	á-lùuɔŋ

It is not possible to infer from a past tense 2nd singular form with an overlong vowel – e.g. *á-càaam* – whether the basic past tense form has a short vowel or a long one. When both are known, however, vowel length throughout the paradigm is predictable.

Now we consider vowel length in nouns. The various alternations in pairs for number are illustrated in (2). In addition to nouns that do not alternate in vowel length (2a), all logical combinations between levels of vowel length are attested: short-long (2b), short-overlong (2c), and long-overlong (2d).

- (2) a. *ɖók ɖók* ‘mouth:SG/PL’ *lɪŋ lɪŋ* ‘war:SG/PL’ *lɔŋ lɔŋ* ‘cat:SG/PL’
b. *túuŋ tũŋ* ‘horn:SG/PL’ *lòut-lòt* ‘stick:SG/PL’ *lúum lùm* ‘grass:SG/PL’
c. *tjél téeel* ‘elbow:SG/PL’ *bát bɒ́ɒ́t* ‘arm:SG/PL’ *dák dɒ́ɒ́k* ‘cooking.pot:SG/PL’
d. *léep léep* ‘tongue:SG/PL’ *dáak dǎaak* ‘herd:SG/PL’ *mâɒt mǎ́ɒ́t* ‘friend:SG/PL’

There is evidence that, when forms in a paradigm in a Western Nilotic language show variation in vowel length, the forms with greater length can be interpreted as diachronic reflexes of suffixed forms, through compensatory lengthening (Andersen 1990, Gilley 1992:130-133).⁵ Given so, it may seem puzzling that in the number pairs for ‘horn’ and ‘grass’, in (2b), the singular has a longer vowel than the plural. In fact, the compensatory-lengthening interpretation is compatible with these cases too: the singular forms of ‘horn’ and ‘grass’, are to be interpreted as morphological marked forms, i.e., as singulatives (Gilley 1992:63-66). Singulative marking is

⁵ This process accounts for the origin of overlong vowel in various Western Nilotic languages. It can be illustrated synchronically using the Shilluk noun *ákɔ́l* ‘drumstick:SG’, which has two plural forms: *ákɔ́l-i* and *ákɔ́ɔ́l*. The former form, with the suffix, is conservative. The latter form has lost the suffix, with its quantity being transferred to the stem vowel (see also Gilley 1992:133).

characteristically found for nouns whose referent is more easily conceptualized as a multitude, like hair, teeth, grain, and horns. In contrast, plural marking is typically found on nouns whose referent can be conceptualized most naturally as a single unit, like family and chief. Then there is a third pattern of number marking, whereby both the singular and the plural form are morphologically complex. This is illustrated by *tʃʌʌ tʃʌʌw* ‘desert date:SG/PL’, where the overlong vowels suggest morphological complexity in both forms.⁶ These three components of the Shilluk number marking system are described in Gilley (1992). The three-part configuration of number marking is common among Nilo-Saharan languages in general (Dimmendaal 2000).

Some nouns that have a short stem vowel in the base form – be it a singular or a plural noun – retain this level of vowel length throughout their paradigm. This pattern is illustrated in (3a), by the base form along with the form marked for 1st singular possession. In parallel with the situation in transitive verbs we can refer to them as ‘Fixed Short’. Then there are ‘Short with Grade’ nouns, which have a short stem vowel in the base form and which lengthen to overlong in some morphological operations. This pattern is illustrated in (3b). Third, there are nouns with a long vowel in the base form, that undergo morphological lengthening in some morphological operations, as in (3c). Note that these three patterns of vowel length alternation are also found within the paradigms of transitive verbs (cf. Table I). In addition, there are nouns that retain a long vowel throughout their paradigm, as in (3d), a pattern that is not found in transitive verbs.

⁷ To resolve this question conclusively, it is necessary to compile a collection of several hundred nouns, phonologically transcribed, including for the suprasegmentals, and then look for conditional regularities and statistically predominant patterns, and examine productivity in number marking on loan words (cf. Ladd, Remijsen & Manyang 2009, Baerman 2012). Reid (2009) is a first step in this direction.

- (3) a. **pūk pūk-āa** 'pot:SG/SG-1SG' b. **wāŋ wāaaŋ-āa** 'eye:SG/SG-1SG' c. **àḍáʌt àḍáʌt-āa** 'bottle:SG/SG-1SG' d. **láac láac-áa** 'urine:PL/PL-1SG'⁸

There are also nouns, singular and plural, that have an overlong vowel in the base form. These become either short or long elsewhere in their paradigm. This is illustrated by the forms in (4). Here again we find vowel alternations of short vs. overlong and long vs. overlong, but the pattern of lengthening is the reverse, in comparison with the forms in (3), even though the same morphosyntactic value is being marked (1st singular possession). We will come across a similar phenomenon in Section 3.1.

- (4) a. **lʌʌp-ḍ lʌp-āa** 'soil-SG/SG-1SG' **kàaak kàk-áa** 'crack-PL/PL-1SG' b. **ḍīim ḍiim-āa** 'sieve:SG/SG-1SG' **lʌʌŋ lʌŋ-áa** 'kindof tree:PL/PL-1SG'

Adjectives also vary in vowel length, and in the same way as transitive verbs. This is illustrated in (5), by the predicate singular forms of six adjectives. The form on the left is used when the adjective expresses a permanent characteristic; the form on the right is used when the characteristic is non-permanent. Again, we find base forms with short (5a) and long (5b) stem vowels alternating with overlong vowels, but also short stem vowels that are fixed short (5c).

- (5) a. **ljet léeeṭ** 'hot' b. **ḍóoc ḍóocḍ** 'good' c. **mēt ù-mèt-ḍ** 'sweet'
mâr ù-màaar-ḍ 'sour' **tīm tīmḥ** 'small' **līp ù-līp-ḍ** 'cold'

In conclusion, vowel length alternations are more systematic in transitive verbs than in nouns. A common characteristic, though, is that there are no lexical items that have an overlong vowel throughout their paradigm. Any root that has an overlong stem vowel in some inflection appears with either a short vowel or with a long stem vowel elsewhere in its paradigm.

2.2 Tone

Like vowel length, tone in transitive verb paradigms reflects both lexical and morphological specifications. Table II extends the paradigms introduced in Table I. In the basic past tense, the specification for tone is morphological: all transitive verbs have the High Fall here. The past tense 2nd singular, however, shows divergence with respect to tone. Here the stem syllable has

⁸ Nouns referring to liquids are grammatically plural in Shilluk.

either the Low toneme or the Low Fall toneme. On this basis, we can distinguish between ‘Low’ and ‘Fall’ verb classes. This tone-based classification cuts across the three length-based patterns (i.e., Fixed Short, Short with Grade, Long), resulting in a total of six verb classes.

Table II. Illustrations of the lexical and morphological specification of vowel length tone, for the seven classes of transitive verbs.

Verb classes	Fixed Short		Short with Grade		Long		
	Low	Fall	Low	Fall	Low	Fall	High Fall
Example	ɲɔl ‘cut’	leŋ ‘drum’	cam ‘eat’	mal ‘roast’	keel ‘spear’	luɣɲ ‘pluck’	luɣɲ ‘take turns’
PST	á-ɲɔ́l	á-léŋ	á-cám	á-mál	á-kéel	á-lóɣɲ	á-lóɣɲ
PST 2SG	á-ɲɔ̀l	á-léŋ	á-càaam	á-máll	á-kèeel	á-lóuɣɲ	á-lóuɣɲ
PST APPL	á-ɲɔ́l	á-léŋ	á-cāaam	á-máll̃	á-kēeel	á-lóuɣɲ̃	á-lóuɣɲ̃
PST APPL 2SG	á-ɲɔ̀l	á-léŋ	á-cāaam	á-máll	á-kēeel	á-lóuɣɲ	á-lóuɣɲ
SPAT/FUG	á-ɲɔ́l	á-léŋ	á-cāaam̃	á-máll̃	á-kēeel̃	á-lóuɣɲ̃	á-lóuɣɲ̃

The difference between Low and Fall verbs is manifested in the same way in certain other morphological operations, such as nominalisations and infinitives – e.g. *léŋ-ɔ* ‘drum-NOM’, *léŋ-ì* ‘drum:INF-SG’, respectively. However, there are also morphological operations in which the tone classes are manifested in a different way. One of these is past applicative. As seen from Table II, the Low verbs take the Mid toneme, and the Fall verbs take the High Fall to Mid toneme. And in past applicative marked for 2nd singular, the Low verbs take the Rise toneme, while the Fall verbs take the High toneme. In general, if Low and Fall verbs diverge in terms of their tonal specification in the marking of a given morphosyntactic value, then the tone pattern of the Fall verbs involves higher fundamental frequency than the tone pattern of the Low verbs.

Finally, there is a seventh transitive verb class, illustrated in Table II by |luɣɲ| ‘take turns (in doing a task)’. The members of this class, labeled ‘Long / High Fall’,⁹ are indistinguishable from

⁹ The label for this class includes ‘High Fall’ because its members take the High Fall in the infinitive, e.g. *lóuɣɲ-ì* ‘take turns:INF-SG’, *máll-ì* ‘greet:INF-SG’, just as the Low and Fall verbs take a Low tone and a Low Fall in the

those of the Long / Low class in the marking of many morphosyntactic values, but they have a different tonal specification among others when marked for spatial deixis. As seen from Table II, |lɔɔŋ| ‘take turns’ has a Low Fall in the centrifugal – *á-lɔɔŋ* – whereas all of the other six classes take the Late Fall – e.g. *á-lɔɔŋ* for |lɔɔŋ| ‘pluck’. Note that the same phonological form – *á-lɔɔŋ* – also constitutes the past tense 2nd singular of |lɔɔŋ| ‘pluck’, a Long / Fall verb. This illustrates that the function of a particular tonal specification depends on the verb class.

The distribution of transitive verbs into these classes is to some extent determined by vowel quality, with the open vowels /a, ʌ/ appearing in Short with Grade classes, but not in Fixed Short classes. In the Long classes, we note that all members of the Long / Low classes encountered so far have half-open vowels, which are rare in the Long / High Fall class. In addition, we find that verbs that typically take a human patient are often members of the Long / High Fall class.

The data in Table II show that tone has a high functional load in the morphology, with eight contrastive tone categories appearing productively in the paradigms. The lexical and morphological functions of tone are further illustrated in (6), using the Fixed Short / Low verb |kɔl| ‘offend’, and the Fixed Short / Fall verb |kɔl| ‘take out’. These verbs are indistinguishable in the basic past tense, which is *á-kɔl* for both verbs. But among others in the past 2nd singular and the past applicative 2nd singular, the two verbs have different tonal specifications.

(6)	kɔl ‘offend’	kɔl ‘take out’
PST	<i>bɔɔl á-kɔl</i> <i>kɪ</i> <i>kɛŋ</i>	<i>cɔɔu á-kɔl</i> <i>kɪ</i> <i>kɛŋ</i>
2SG	Bol PST-offend:2SG LOC place:SG&DEM ‘You offended Bol here.’	bone:PL PST-take:2SG LOC place:SG&DEM ‘You took out (fish)bones here.’
PST	<i>wɔɔc á-kɔl</i> <i>bɔɔl</i>	<i>ŋɔɔom á-kɔl</i> <i>cɔɔu</i>
APPL	letter:PL PST-offend:APPL.2SG Bol	awl:SG PST-take.out:APPL.2SG bone:PL
2SG	‘You offended Bol through letters.’	‘You used an awl to take out (fish)bones.’

In nouns, the range of variability in tonal specifications is greatest in the singular and plural base forms, and more limited elsewhere in the paradigm. There are some tendencies here that are worth noting. For example, the Rise is found on several tools (e.g. *ŋɔɔom* ‘awl:SG’, *bɛŋ* ‘fishing

same inflection, respectively. As we will see in section 3.1, the High Fall also shows up in other inflections where Long / High Fall verbs diverge from the other classes.

spear:SG’), and the High Fall to Mid on plural nouns (e.g. *púuuṯ* ‘dried.manure:PL’, *báááṯ* ‘processed.milk:PL’, *wáááṯ* ‘night:PL’). The Late Low Fall is only found in the demonstrative of Mid-toned nouns that have an overlong vowel (cf. Section 2.4).

2.3 ATR and vowel quality

Most transitive verbs have a –ATR root vowel (i.e., one of /ɪ, ɛ, a, ɔ, u/), which predominates in the morphological paradigm. But some operations involve a change to the corresponding +ATR vowel – i.e., /i, e, ʌ, o, u/, respectively. This is illustrated in Table III, on the basis of inflections for spatial deixis, a productive morphological operation in Shilluk. Spatial deixis comprises two morphosyntactic values: centrifugal and centripetal, conveying movement away from vs. towards a point of reference, respectively. The ATR value of the root is found in the centrifugal form. In the centripetal, the stem vowel becomes +ATR. This change to +ATR in the centripetal form is accompanied by raised vowel height, if the vowel is short and if its quality is half-open. In Table III, this is illustrated by the two Fixed Short verbs: the root vowels /ɛ/ and /ɔ/ become /i/ and /u/, respectively, rather than /e/ and /o/. We will return to this interaction between vowel height and vowel length in Section 3.1.

Table III. Past tense forms marked for spatial deixis, for the seven transitive verb classes.

Verb classes	Fixed Short		Short with Grade		Long		
	Low	Fall	Low	Fall	Low	Fall	High Fall
SPAT/FUGAL	<i>á-ŋɔ̀</i>	<i>á-léṯ</i>	<i>á-cáaam̩</i>	<i>á-máááṯ</i>	<i>á-kéeeṯ</i>	<i>á-lóuuṯ</i>	<i>á-lóuuṯ</i>
PETAL	<i>á-ŋúṯ</i>	<i>á-líṯ</i>	<i>á-cáááam̩</i>			<i>á-lúuuṯ</i>	<i>á-lúuuṯ</i>

The data in Table III also show that, if the root vowel is [+ATR] in the first place, as in the case of |mál| ‘roast’ and |keel| ‘spear’, then the change in the ATR value applies vacuously. In a form like *á-kéeeṯ*, the exponents of length and tone still convey movement, but the orientation of this movement relative to the point of reference remains vague.

Spatial deixis is a valency-increasing operation, as the destination is optionally included as an internal argument, i.e., without a preposition. If the event involves directional movement inherently, as in the case of |ləeṯ| ‘throw’, then spatial deixis specifies the directionality of the

patient – e.g. *lòut á-léeeŋ* ‘Somebody threw the stick (in this direction)’. If the event does not involve movement inherently, then spatial deixis conveys a movement of the agent towards a location where the event takes place – e.g. *būul á-kóók* ‘Somebody went away to pay Bol’.

A change in ATR value is not part of the paradigms of either singular or plural nouns. Between singular and plural, however, we do find changes in ATR (7a), and also other vocalic changes (7b). As noted above, number marking in nouns is not regular.

- (7) a. *gwéec gwêec* ‘stirring.stick:SG/PL’ *dâk dâak* ‘cooking.pot:SG/PL’ b. *jāat jēn* ‘tree:SG/PL’ *lòut lôt* ‘stick:SG/PL’

Another vocalic process involves the excrescence of a semivowel, as in the noun pair *ábwōok* *ábòook* ‘maize:SG/PL’, and the predicate adjective pair *dwóŋ dòŋ-ò* ‘big:SG.PERM/PL’.

2.4 The stem-final consonant

There are productive patterns of exponence affecting the stem-final constituent, but none that change the stem-initial one. In this section we present the two most common alternations of this type. First, root-final /l/ and /r/ both alternate with /t/. In verbs, this process is found systematically in the derivation of the antipassive – e.g. *á-ŋùt* from *|ŋol|* ‘cut’, and *á-kèet* from *|keel|* ‘spear’. As seen from these examples, the marking of this morphosyntactic value additionally involves the above-mentioned ATR alternation, tonal marking (change to Low for most classes) and overlengthening (unless the verb is Fixed Short). In nouns, the same consonantal alternation from a liquid to /t/ is part of the (irregular) marking of number in pairs such as *pāal pāt* ‘spoon:SG/PL’ and *kāal kâat* ‘cattle camp:SG/PL’. Another consonantal change between singular and plural noun forms involves a replacement by /k/ in the plural, as in *djêel* *djêek* ‘goat:SG/PL’, *djàaŋ dòk* ‘cow:SG/PL’.

The second productive pattern of alternation affecting the stem-final consonant is nasalization. Nasalization is part of the exponence of demonstrative nouns. There are two separate patterns of exponence to mark demonstrative on singular nouns, both of which involve nasalization. One involves a suffix /-i/, as in *dāaŋ-ò dāaŋ-i* ‘woman-SG/:SG-DEM’; the other is purely stem-internal. There is no difference in meaning, and only one pattern is available for any singular noun. Examples of the stem-internal marking are presented in (8). As seen from these examples, a stem-final plosive is replaced by a homorganic nasal – that is, /p,t,t,c,k/ are replaced by

/m,n,n,n,n/, respectively. Nasalization is accompanied by lengthening of the stem vowel (unless the root is Fixed Short); the tones found in this inflection are Late High Fall, Late Mid Fall, Low Fall and Low, all of which end in a low end target. This low end target is in keeping with the suffixal marking of demonstrative, i.e. /-ì/, out of which the stem-internal pattern is likely to have developed. The changes in length and tone are critical to convey demonstrative when the root-final consonant is not a plosive.

- (8) **tík tîŋ** ‘chin:S/S.DEM’ **kwān kwāāān** ‘porridge:S/S.DEM’ **kāal kaaal** ‘camp:S/S.DEM’
bāt bàaan ‘arm:S/S.DEM’ **jāat jāaan** ‘tree:S/S.DEM’ **ādāt ādāāān** ‘bottle:S/S.DEM’

Demonstrative marking on singular nouns is the only area of the grammar where nasalization is consistently part of the marking of a morphosyntactic value. It is also found less systematically in the marking of possession, for some nouns. Gilley (1992:184) notes that nasalization in possessed forms is restricted to derived nouns. Finally, nasalization is part of the exponence of the iterative, for a subset of the transitive verbs (cf. Section 3.1).

3. Affixal exponence

Affixed word forms in Shilluk do not consist of easily segmentable sequences of lexical roots with discrete function morphemes around them. Instead, the exponence of many morphological operations involves an affixal component in addition to stem-internal marking. In segmental terms, the number of common affixes is small: there are the prefixes /a-, u-/ and the suffixes /-ɔ, -a(a), -i(i)/. However, these vocalic elements are found with a variety of suprasegmental specifications, marking a wide range of morphosyntactic values. For example, /-i(i)/ is involved in the marking of 2nd singular, benefactive, iterative, and instrumental nominalisation on verb roots, and of plural, demonstrative, 2nd singular, and construct state on noun roots. In addition, there are a few suffixes that are restricted in their functional scope, such as the reduced forms of personal pronouns, which serve as markers of subject on verbs and of the possessor on nouns. In the following subsections, we lay out affixal exponence in transitive verbs and in nouns.

3.1 Affixation in transitive verbs

Table IV presents several morphological operations that involve a prefix /u-/. The marking of future tense involves High-toned /ú-/. This morphological operation involves the same stem form

as the basic past tense (cf. Table II) – e.g. *ú-cám* ‘FUT-eat’ vs. *á-cám* ‘PST-eat’. High-toned /ú-/ is also found in the non-evidential past, but here the stem form is different: the non-evidential past involves the long grade of the stem (unless the root is Fixed Short). The imperfective has the same stem form and suffix as the non-evidential past, but with a Low-toned prefix /ù-/. As for the tonal specification of the stem syllable in the non-evidential past and in the imperfective, both of these inflections reveal the three tone-based classes: that is, the Low verbs have a Low tone, the Fall verbs a Low Fall, and the High Fall verbs a High Fall (just as in the infinitive form). There is also a weakly realized suffix /-ɔ/, which is Low-toned for all classes other than High Fall verbs, where it carries the Mid toneme.

Table IV. Forms involving the prefix /u-/, illustrated for the seven transitive verb classes.

Verb classes	Fixed Short		Short with Grade		Long		
	Low	Fall	Low	Fall	Low	Fall	High Fall
FUT	ú-ŋɔ́l	ú-lɛ́ŋ	ú-cám	ú-mál	ú-kéel	ú-lóɔŋ	ú-lóɔŋ
NEVID.PST	ú-ŋɔ́l-ð	ú-lɛ́ŋ-ð	ú-càaam-ð	ú-máλλl-ð	ú-kèeel-ð	ú-lóɔŋ-ð	ú-lóɔŋ-ɔ
IMPF	ù-ŋɔ́l-ð	ù-lɛ́ŋ-ð	ù-càaam-ð	ù-máλλl-ð	ù-kèeel-ð	ù-lóɔŋ-ð	ù-lóɔŋ-ɔ
FUT APPL	ú-ŋɔ́l	ú-lɛ́ŋ	ú-cāaam	ú-máλλl̄	ú-kéeel	ú-lóɔŋ̄	ú-lóɔŋ̄
COND.FUT	ù-ŋɔ́l	ù-lɛ́ŋ	ù-cāaam	ù-máλλl̄	ù-kèeel	ù-lóɔŋ̄	ù-lóɔŋ̄

The future applicative and the conditional future also differ from one another in that the one has High-toned /ú-/ and the other Low-toned /ù-/. The stem form is the same, and it is what sets them apart from the other forms listed in Table IV. The stem is in the long grade, and carries the Mid toneme for Low and High Fall verbs and the High Fall to Mid toneme for Fall verbs. The other prefix that is heavily used is /a-/. It similarly combines with different tonal specifications and with different stem forms (cf. Table II). Overall, this overview of prefix /u-/ in transitive verbs illustrates how exponence in Shilluk is often distributed between affixes and the stem. In order to determine the morphological composition of a verb, it is essential to consider both.

As noted above, the most common suffixes are /-ɔ/, -l, -a/. The /-ɔ/ suffix goes together with the long grade of the stem vowel (overlengthening), unless the verb is Fixed Short (see Tables II and IV). The suffix /-l/, in contrast, goes together with a reduction in vowel length in the stem. It is

found among others in the benefactive and in the iterative, both illustrated in Table V. Apart from the suffix, these two inflections also share the specification for tone: there is a High toneme on the stem syllable in all classes other than Long / High Fall; this class takes the Low Fall instead. The main difference between them is the ATR alternation (cf. Section 2.3): the change to +ATR is part of the exponence of the benefactive, but not of that of the iterative.

Table V. Past-tense benefactive and iterative forms, illustrated for the seven verb classes. The High Fall class is represented by |maam| ‘concede’.

Verb classes	Fixed Short		Short with Grade		Long		
	Low	Fall	Low	Fall	Low	Fall	High Fall
BEN	á-ŋúl-ì	á-líŋ-ì	á-cám-ì	á-mál-ì	á-kéel-ì	á-lúp-ì	á-mám-ì
ITER	á-ŋól-ì	á-léŋ-ì	á-cáam-ì	á-mál-ì	á-kéel-ì	á-lóŋ-ì	á-mâm-ì

These two inflections are remarkable with respect to the length of the stem vowel. Consider first the benefactive. The Short with Grade verbs have a short vowel here. This suggests that the benefactive does not involve morphological lengthening. For the three Long verb classes, however, the stem vowel in the benefactive is either short or long. Additional examples of the past tense benefactive are presented in Table VI. They reveal that there is variability in terms of vowel length within the Fall and High Fall classes.

Table VI. Additional examples of the past-tense benefactive forms for Long verbs.

Long / Low	Long / Fall	Long / High Fall
á-léēŋ-ì < lēŋ ‘throw’	á-téēŋ-ì < tēŋ ‘dust’	á-côol-ì < cwôol ‘call’
á-góoc-ì < gôoc ‘hit’	á-gírì < gír ‘turn’	á-mât-ì < mât ‘greet’
á-dóok-ì < dook ‘lift’	á-tál-ì < taal ‘cook’	á-lûŋ-ì < lûŋ ‘take turns’

This divergence with respect to the length of the stem vowel among Long verbs is noteworthy, because, as seen from Tables I-IV, the Long verbs pattern together for stem vowel length in terms of vowel lengthening. So what is governing the length of the vowel in the benefactive of Long verbs? Inspection of the data in Tables V and VI suggest that it is about vowel quality and ATR. If the root vowel of a Long verb is /ɛ/ or /ɔ/, the benefactive has a long vowel, i.e., /ee/ or

/oo/, respectively. Otherwise, the vowel in the benefactive is short. Note that there is a more general pattern here: in Fixed Short stems, the same vowels /ε/ and /ɔ/ do not go to their [+ATR] counterparts (short /e,o/) either, but to /i,u/ instead (cf. Table V). In both cases, short /e,o/ are avoided by the morphological process.

The iterative offers further insight into this interaction between vowel length and vowel quality. This inflection also involves a short vowel for the majority of the classes, but without the change to [+ATR]. Note in Table V that |luɯŋ| ‘pluck’ does not appear with its root vowel here: instead of *á-lúŋ-ì, we find *á-lɔŋ-ì*. Other underlying closed [-ATR] vowels show the same pattern, e.g. *á-gér-ì* from Long / Fall |gɪr| ‘turn around’, and *á-kɔt-ì* from |kuɤt| ‘blow’. Systematically, we find short /ε,ɔ/ where regularity would predict /I,U/. Taken together with the earlier observations re. the benefactive and the centripetal, this is suggestive of a system with only /I,ε,a,ʌ,ɔ,u/ on short vowels that result from morphological specification. However, the half-open [+ATR] and closed [-ATR] qualities do occur lexically on short vowels, as in *dòk* ‘cow:PL’.

In addition, the iterative deviates from the benefactive in terms of vowel length in the Short with Grade / Low class. Note that, in Table V, the iterative of |cam| ‘eat’ is *á-cáam-ì* rather than **á-cám-ì*. Evidently, the vowel has lengthened morphologically here – not to overlong, as it does elsewhere in its paradigm (Tables I-IV), but to long. Additional examples are presented in (9). They reveal that the exponence involves not only a long vowel but also nasalization. Most members of the Short with Grade / Low class pattern along with |cam| ‘eat’ in this respect.¹⁰ The Long / Low verbs also have a long vowel in the iterative, but without nasalisation – e.g. *á-góɔc-ì* from |gɔɔc| ‘hit’.

- (9) *á-jáaŋ-ì* (<|jak| ‘pull’) *á-nɔaŋ-ì* (<|nɔk| ‘kill’) *á-cwáaŋ-ì* (|cwak| ‘defend’)

In summary, most members of the Short with Grade / Low class have lengthening (to /vv/, not to /vvv/) in the iterative, whereas the same operation is characterized by morphological shortening for most other verbs. For example, the Short with Grade / Low verb |nɔk| ‘kill’ yields *á-nɔaŋ-ì*, but the Long / Fall verb |taal| ‘cook’ yields *á-tál-ì*. Reh (1996) reports a similar phenomenon for the iterative in Anywa, a closely related language: there as well, morphological quantity cannot be stated uniformly across verbs for this inflection.

¹⁰ We know of two exceptions, where Long / Low verbs follow the more general pattern of the iterative, with a short vowel and without nasalization: *á-kak-ì*, from |kak| ‘split’; *á-táj-ì* from |taj| ‘apply tribal marks’.

Overall, both the benefactive and the iterative present some phenomena that are not predictable from the division into verb classes as laid out in Section 2.1. The divergence among Long verbs points to an interaction between vowel length and vowel quality. In this context, it is worthwhile to note that in Dinka as well, the inventory of vowels is restricted on short vowels (Andersen 1987:11). These interactions can be attributed to the influence of time pressure.

The third common suffix is /-a/. In verbs, it is found in constructions that alter constituent order within the clause. This is illustrated in (10). The unmarked structure of a transitive main clause is shown in (10a,b): the internal argument (object) appears before the verb, and the agent appears in an optional constituent, introduced by the ergative marker /ɪ/ (cf. Miller & Gilley 2001). The order of arguments can be inverted, as in (10c,d). This inversion is marked by the /-à/ suffix, along with a tonal marker: the verb's lexical specification for tone surfaces (|cam| and |ɲɔl| are both members of Low classes). The function of this operation, it appears, is to convey narrow focus on the constituent that follows the verb.

- | | |
|---|---|
| <p>(10) a. kwān á-cám ɪ būul
 porridge:SG PST-eat ERG Bol
 ‘Bol ate the porridge.’</p> | <p>b. jāaɬ á-ɲól ɪ būul
 tree:SG PST-cut ERG Bol
 ‘Bol cut the tree.’</p> |
| <p>c. būul á-cám-à kwān
 Bol PST-eat-FOC porridge:SG
 ‘Bol ate specifically the porridge.’</p> | <p>d. būul á-ɲòl-à jāaɬ
 Bol PST-cut tree:SG
 ‘Bol cut specifically the tree.’</p> |

The construction in (10c,d) mirrors a comparable process in Pări, reported in Andersen (1990). Like Shilluk, Pări signals marked constituent structure using a suffix /-a/. Andersen contrasts this structure with Dinka, where the difference between the basic argument structure and the marked one with reversed word order involves an increase in the vowel length of the stem, but no suffix. Shilluk and Pări, then, both represent the more conservative pattern: the suffix that triggered compensatory lengthening in Dinka is still present in these languages.

3.2 Affixation in nouns

In nouns as well, a wide range of morphosyntactic values is encoded by combining a small number of segmental affixes with particular specifications for tone and vowel length on the stem syllable and on the affix. This is illustrated in Table VII. For example, the noun for ‘compounds’

has the vowel suffix /-i(i)/, in three inflections, marking plural; plural + second singular: and demonstrative, respectively. These two paradigms also show that there is a phonological sandhi process whereby a High Fall becomes High before a High tone.

Table VII. A subset of the morphological paradigms of two nouns.

	POSS1SG	POSS2SG	POSS3SG	POSS1PL.IN	DEM
nâam ‘river:SG’	nâaam-āa	nâaam-īi	nâaam-ē	nâaam-ēē	nâaam
kāāl-ī ‘compound-PL’	kāāl-āa	kāāl-īi	kāāl-ē	kāāl-ēē	kāāl-ī

Different from transitive verbs, noun roots can be polysyllabic, although the monosyllabic template predominates here as well. Examples of polysyllabic noun roots are presented in (11). Note that the word shape is similar to that of affixed transitive verbs: there is a cvc sequence, preceded and/or followed by a vowel.

- (11) **úgīik** ‘buffalo:SG’ **úgōt** ‘cloth:SG’ **ábwōok** ‘maize:SG’ **ākēelō** ‘grain dish:SG’

The main prefixes in nouns are again /a-/ and /u-/. In nouns these prefixes are both derivational in nature. The restricted composition of polysyllabic nouns, illustrated in (11), suggests that they result from morphological derivation, even where this origin is no longer evident synchronically. This hypothesis is supported by the fact there are also some polysyllabic nouns where the same affixes clearly reflect morphological derivation. The prefix /à-/ is found productively in patient nominalizations of transitive verbs, such as **à-ŋāl** ‘PTNMLZ-cut’ (a circumcised person), **à-māk** ‘PTNMLZ-catch’ (a prisoner). In each case the derived noun refers to the undergoer of the event. The prefix /ú-/ marks a masculine individual, as in **ú-ŋāal-ŋ-ŋ** ‘Dinka male’, **ú-cōvul-ŋ** ‘Shilluk male’. Further discussion of nominal prefixes can be found in Gilley (1992:77-78).

The most common noun suffixes are /-i/ and /-ɔ/. Like the prefixes, they are familiar from the morphology of transitive verbs. In the noun system, /-ɔ/ is a singulative marker, and /-i/, with a short vowel, marks plural and demonstrative. Illustrations (12a) and (12b) present examples of these two suffixes, respectively. Nouns where both singular and plural are marked for number through suffixes are rare. An example is **kāaaan-ɔ kâan-i** ‘type of palm tree-SG/PL’. The examples in (12) show that affix-based number marking is almost always accompanied by stem-internal differences between corresponding singular and plural forms. That is, as in verbs, affixation

interacts with stem-internal exponence. The crucial difference is that in the morphological marking of number on nouns, the patterns of exponence are not predictable.

- (12) a. cɪŋ-ð cɪŋ wéel-ð wéel bjéel-ð bjéel piin-ð pɪn
 ‘hand-SG/PL’ ‘guest-SG/PL’ ‘grain-SG/PL’ ‘cheek-SG/PL’
- b. dʒiim diim-ì pūk pūk-ī kəl kəl-ī pjēn pēen-ī
 ‘sieve:SG/PL’ ‘clay.pot:SG/PL’ ‘compound:SG/PL’ hide:SG/PL’

The examples in (12b) illustrate the fact that the plural marker /-ɪ/ is not found after noun stems with an overlong vowel. We have observed the same generalization in relation to the benefactive and iterative forms of transitive verbs, where most Long verbs appear with a short stem vowel before the suffix /-ɪ/. This suggests that the suffix /-ɪ/ conditions a reduction in stem vowel length throughout the morphology. Support for this interpretation comes from plural marking in a particular class of instrumental nouns, which are derived from transitive verbs. Examples are presented in the leftmost column in Table VIII. The singular form is derived through /-ɪ̃/ suffixation, along with several stem-internal changes: the ATR alternation, High tone, and overlengthening, unless the verb stem is Fixed Short. The vowel length in the singular is the same as in the past tense 1st singular of the source verb, which also displays the long grade.

Table VIII. Examples of instrumental nouns in singular and plural, and some forms of the paradigms of the transitive verbs from which they are derived.

INSTR NOUN SG/PL	Root	PAST, PAST 1 ST SG.	BENEF
ɲíc-ɪ̃ , ɲíc-ī̃ ‘sign, symbol’	ɲic ‘recognise’	á-ɲíc , á-ɲíc-á	á-ɲíc-ì
rɔɔɔɲ-ɪ̃ , rɔɔɲ-ī̃ ‘mirror’	raɲ ‘inspect’	á-rɔɔɲ , á-rɔɔɔɲ-á	á-rɔɔɲ-ì
jɔɔɔk-ɪ̃ , jɔɔk-ī̃ ‘e.g. rope’	jak ‘pull’	á-ják , á-jɔɔɔk-á	á-ják-ì
góooc-ɪ̃ , góoc-ī̃ ‘machete’	gɔɔc ‘hit’	á-góɔc , á-gɔɔɔc-á	á-góoc-ì
téeeɲ-ɪ̃ , téeeɲ-ī̃ ‘e.g. cloth’	tɛɛɲ ‘dust’	á-téeeɲ , á-téeeɲ-à	á-téeeɲ-ì
tɔɔɔɲ-ɪ̃ , tɔɔɲ-ī̃ ‘pillow’	tɔɔɲ ‘rest’	á-tɔɔɲ , á-tɔɔɔɲ-à	á-tɔɔɲ-ì
mín-ɪ̃ , mín-ī̃ ‘e.g. needle’	mɪɪn ‘pierce’	á-mín , á-mɪɪn-à	á-mín-ì
kút-ɪ̃ , kút-ī̃ ‘e.g. pipe’	kuɔt ‘blow’	á-kóuɔt , á-kóuɔt-à	á-kút-ì

Now consider the plural forms, which have the suffix /-ɪ/. The stem vowel in this form is either short or long. As seen from the verb forms presented alongside, the level vowel length in these plural forms is identical not to the basic past tense, i.e., to the short grade of the stem, but to the benefactive. The bottom three examples in Table VIII make it possible to discern between these descriptive analyses. That is, for |tʌʌŋ|, |mɪɪn|, and |kuʊt|, the benefactive has a shorter stem vowel than the past tense, and we see the same level of vowel length in the stem of the plural form of the instrument noun. As noted in Section 3.1, for Long verbs it is vowel quality that determines whether the root vowel is short or long in the benefactive. Crucially, verbs that have a long vowel in the benefactive, such as |gɔɔc| and |tɛɛŋ|, also have a long vowel in the plural form of the instrument noun. Moreover, the hypothesis that the vowel length in the stem syllable of the plural of the instrumental would mirror the iterative rather than the benefactive can be rejected on the basis of Short with Grade verbs, that diverge in vowel length between iterative and benefactive. One of these is |ɟak| ‘pull’, which has the iterative *á-ǰáaŋ-ɪ*. In conclusion, the short /-ɪ/ suffix conditions a shortening of the stem vowel in nouns and in verbs alike.

4. Discussion

4.1 Characteristics of stem-internal morphology

Shilluk presents a rich system of morphological marking with a small segmental footprint. Morphological exponence is characterized not by the concatenation of discrete morphemes, but rather by a stacking of morphological operations within a confined domain, consisting of the stem and a limited window of affixes. In such a system, morphological marking is restricted by the fact that the stem syllable can have only one specification each for tone, length, vowel quality, ATR, and the stem-final consonant, and these specifications need to convey both lexical and morphological information. One way in which the use of these resources is maximized is through distributed exponence, whereby a morphophonological pattern realizes two morphosyntactic values. An example of this is presented in (13): here the combination of the Rise toneme with morphological lengthening conveys both spatial deixis (centrifugal) and 2nd person agency.

- (13) gjèεεn-ò á-lǔʊʊɲ

chicken:SG PST-pluck:FUG.2SG

‘You have gone away to pluck a chicken.’

Stem-internal marking can result in a loss of contrast, either at the lexical or at the morphological level. Lexical ambiguity results when a stem-internal morphological process obscures the lexically distinctive features. As seen from Table II, for example, the transitive verb roots $|\text{looŋ}|$ ‘pluck’ and $|\text{looŋ}|$ ‘take turns’ are indistinguishable in the basic past tense, where the High Fall overrides the lexical difference in tonal specification. Morphological ambiguity results when a stem-internal morphological marker is already part of the lexical specification. This is illustrated by spatial deixis. The vocalic process involving a change to +ATR is the sole marker of centripetal relative to centrifugal. As a result, this morphosyntactic contrast can be morphologically marked only when the root vowel is –ATR to begin with. When the root vowel is +ATR, as in $|\text{ma}|$ ‘roast’, then there is macrofunctionality: $|\text{á-máááá}|$ conveys movement to the location where the event takes place, but the orientation relative to the point of reference is vague. In contrast, stem-internal exponence is more robust when several phonological parameters are altered, as in demonstrative marking on nouns. The demonstrative can be marked on nouns through the combination of nasalization of the stem-final consonant, tonal marking, and overlengthening. If nasalization does not apply (because the consonant is not a plosive), then demonstrative is still marked through tone and length, as in $|\text{káááá}|$ ‘cattle camp:SG.DEM’, from $|\text{káááá}|$ ‘cattle camp:SG’.

Pike (1948) discusses similar phenomena in the Otomanguean language Mazatec, among others in relation to the marking of 1st singular on verbs. This morphosyntactic value is marked by the addition of the vowel /-a/, combined with a lower-mid tone target.¹¹ As seen from (14), both of these markers are effective in *tʰ*² ‘burn’. But *nčoa*² ‘come’ ends in /a/, so that 1st singular is marked solely through tone. Finally, for *ka*⁴⁻³ ‘fall’, the 1st singular is not morphologically distinct, because its stem-internal markers coincide with lexical specification.

¹¹ Pike transcribes the tone pattern of a word following its segmental sequence, using a convention that represents the tone space using the numerical range from 1 (top) to 4 (bottom). The addition of a vocalic suffix does not increase the quantity of the syllable nucleus, and “the tonemes tend to be spread over the nucleus with little or no regard for its vocalic composition” (Pike 1948:97).

(14)		‘burn’	‘come’	‘fall’	from Pike (1948)
	3SG	ti ² ‘burn’	nɕoa ²	ka ⁴⁻³	
	1SG	tia ²⁻³ ‘burn’	nɕoa ²⁻³	ka ⁴⁻³	

In summary, the extent to which a morphosyntactic value can be realized within the stem hinges on the relation between the phonological specification of the root and the stem-internal markers of the morphological process. This characteristic of stem-internal morphology presents a potential risk of syncretism, as shown by the above examples from Shilluk and Mazatec.

Another characteristic of stem-internal morphology is that the potential to combine morphological operations is restricted. As Andersen (1992-1994) has pointed out in relation to Dinka, different morphological operations may place conflicting demands on the stem-internal features. In (15) this issue is illustrated for Shilluk. The basic past tense of the Long verb |maat| ‘drink’ appears in (15a). The vowel shortens in the iterative under /-i/ suffixation (15b), but lengthens in the applicative, which among others conveys instrumental (15c). That is, iterative and applicative involve opposite specifications for vowel length: it is not possible to use it as an exponent for both of these operations.

- (15) a. càak á-máat̚
milk:PL PST-drink
‘Somebody drank milk.’
- b. càak á-mát̚-i
milk:PL PST-drink-ITER
‘Somebody drank milk repeatedly.’
- c. lwôol á-máaãt̚ càak
cup:SG PST-drink:APPL milk:PL
‘Somebody drank milk using a gourd.’
- d. lwôol á-mát̚-i càak
cup:SG PST-drink-ITER milk:PL
‘Somebody drank milk repeatedly using a gourd.’

However, iterative and applicative can be combined nonetheless. This is illustrated in (15d). The verb is in the iterative, and the expression of the applicative is purely syntactic: the instrument is

not expressed by means of a prepositional phrase (*kí lwôl*) but as an internal argument, displacing the patient from its normal preverbal position.

4.2 The development of stem-internal morphology in Western Nilotic

Stem-internal morphology has developed in Shilluk and other Western Nilotic languages in step with the loss of suffix-based morphology. This process has gone the furthest in Dinka. Andersen (1990) presents comparative evidence for the hypothesis that three-level vowel length in Dinka results from compensatory lengthening, triggered by suffixes that have been lost subsequently. In contrast, other Western Nilotic languages such as Pāri and Anywa have retained more of the suffixal morphology, and also the original two-level vowel length contrast. In this comparative context, the Shilluk system represents an intermediate stage: stem-internal morphology is widespread, but so are suffixes. This is illustrated in (16), which shows the morphological marking for a singular subject on verbs in Anywa (cited from Reh 1996:195), Dinka, and Shilluk. All three forms are marked stem-internally in Dinka, while only the 2nd singular is in Shilluk. The Anywa forms all involve suffixes.

(16)	Dinka maan ‘hate’	Shilluk maat ‘drink’	Anywa máaDH ‘drink’
1SG	ǎ-màaan	á-mâaat-à	ā-máaDH-á
2SG	ǎ-máan	á-mâaat	ā-màaDDHí
3SG	ǎ-mèeen	á-mâaat-è	ā-máaDH-é

Comparative data like those in (16) suggest that the development towards stem-internal morphology may have further to go in Shilluk. This interpretation is supported by the fact that there is synchronic variation between and within speakers in the extent to which the suffixes /-ɔ/ and /-ɪ/ are realized, both in nouns and in verbs. In this context, it is worthwhile to examine the Shilluk morphological system for insights as to why and how stem-internal morphology is developing. Several characteristics are of interest here.

First, the development of stem-internal morphology is conditional on an interaction between an affix and an alternation in the stem. Going back to the comparative evidence in (16), we can see that such an interaction is present in the marking of 2nd singular in Anywa: the differences in tone and consonantal quantity reliably distinguish the 2nd singular from the corresponding 1st and 3rd singular forms. At this point, the stage is set for the 2nd singular suffix to disappear without

loss of morphological contrast within this paradigm. The survey of affixal morphology in Section 3 shows that this type of interaction is widespread in Shilluk. Consider for example the forms involving the /ʊ-/ prefix in transitive verbs (Table IV), where the particular morphosyntactic value can never be unambiguously established based on the prefix alone. Similarly, the suffixes /-ɔ/ and /-ɪ/ each tend to go together with a particular pattern of vowel length in the stem: /-ɔ/ is found with increased vowel length, and /-ɪ/ with decreased vowel length, both relative to other forms in the same paradigm.

Second, it has become clear that the set of affixes is small, and that the same ones are used in the marking of many morphosyntactic values. The wide-ranging use of the same segmental affixes limits their information value, in particular relative to the suprasegmental patterns they co-occur with.

A third relevant characteristic is that, even when affixes involve different vowels, the phonological structure is still very similar: in terms of their segmental composition, affixal exponence is mostly limited to a vowel. As soon as the vowel weakens to schwa, affixal contrast is reduced altogether. Impressionistically, we find it at times difficult to retrieve which suffix is involved in word forms.

A fourth and final observation relates to the sequencing of inflected word forms in utterances. Lexical roots are predominantly closed monosyllables, and prefixes and suffixes are mostly vowels. As a result, affix vowels are frequently in hiatus in utterance contexts. A particularly common juncture is that of a noun followed by a verb – this is the unmarked order in a clause involving a transitive verb and its internal argument. Two examples are presented in (17). In (17a), the segmental content of the Low-toned noun suffix vowel is not audible. However, the suffix leaves a trace, in that it lowers the fundamental frequency of the High-toned verb prefix, and the duration of the prefix vowel is also increased. In (17b), the segmental content of the /ʊ-/ prefix on the second verb in a serialisation is inaudible, but it leaves traces in terms of quantity and tone: /já ʊ-/ is realised as [jáà].

- (17) a. wɔɔɔɔ-ɔ á-mɔɔɔɔɔɔɔɔ bɔɔɔ
 letter-SG PST-greet:APPL Bol
 ‘Somebody has greeted Bol using a letter.’
- b. já nɔɔɔ já ʊ-cɔɔɔɔɔɔɔɔ-ɔ

PRON1SG AUX(still) PRON1SG IMPF-eat
'I am still eating.'

These examples illustrate how the suprasegmental specification of an affix can be evident even when its segmental content is lost. When such processes apply within a word, i.e., between an affix and a stem, then the exponence of the morphological operation can be systematically reinterpreted as being of a purely suprasegmental nature, through hypocorrection (Ohala 1989).

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